

# **POCKET KNIFE WITH LOCK DESIGN**

## **BACKGROUND OF THE INVENTION**

### **1. Field of the Invention**

The present invention relates to a pocket knife with a lock design, in particular to a foldable knife that provides supplemental driving force to extend the blade of the knife from the handle to an open position by a semi-automatic operation.

### **2. Description of Related Arts**

The current designs of pocket knives can be categorized as the flick knife and the foldable knife. The flick knife utilizes the pressing force on the lock release mechanism of the handle to unlock the spring, and then the recoiling force of the spring causes the blade to shoot out from the front end of the handle. According to the designs of flick knives, the blade moved by the recoiling force of the spring can also cause bodily harm to the user if the flick knife is not properly handled. If the flick knife is dropped accidentally when being carried or operated improperly, the razor-sharp blade may be ejected automatically when the knife falls to the ground and receives a jolt.

However, by the design of the foldable knife, the movement of the blade is controlled by a pivot joint, and the blade has to be opened out and returned manually, and is received in the inner space of the handle. Unlike the flick knife, the foldable knife does not use any spring mechanism to extend the blade from the handle. This design makes it safer to operate but, at the same time, sacrifices some operability.

Since the design of conventional foldable knife cannot provide

1 automatic opening of the knife and operation safety at the same time, a modified  
2 foldable knife has been proposed by the applicant, in which the structure of the  
3 modified foldable knife has incorporated a supplemental driving aid, formed by a  
4 holding block, a guide roller and a resilient pin installed inside the handle, such  
5 that when the user pulls out the blade from the handle of the knife at a  
6 predetermined angle, then a supplemental driving force will be produced by the  
7 action of the resilient pin to assist the extension of the blade to the open position,  
8 thus enhancing the operability by means of a semi-automatic operation.

9         Although the modified foldable knife design is able to meet the users'  
10 expectation for automatic operation, the mechanical driving aid of the foldable  
11 knife requires the addition of a guide roller in the handle corresponding to the  
12 side wall of the blade that takes the pressure from by the resilient pin. therefore,  
13 the thickness of the handle has to be increased to meet the above requirement.  
14 However, the enlarged size of the foldable knife will affect the portability of the  
15 knife, and also the guide roller and the resilient pin as part of the mechanical  
16 driving aid to supplement the extension of the blade do not work in perfect unison  
17 at all times.

## 18 SUMMARY OF THE INVENTION

19         The main object of the present invention is to provide a pocket knife with  
20 a lock design incorporating a supplemental mechanical driving aid to solve the  
21 prior art problem of thickness of the foldable knife and to improve the  
22 supplemental driving force when extending the blade from the handle.

23         To this end, the present invention uses a pivot joint at the front end of  
24 handle to control the movement of the blade, a safety lock placed inside handle

1 corresponding to the side wall of blade in the closed position, and a resilient pin  
2 installed in the handle corresponding to the back end of the blade, wherein the  
3 back end of the blade has a shoulder for engaging the resilient pin and a pin catch.  
4 The safety lock has a spring tab with a raised head, which is used to press against  
5 the back end of the blade when the blade is being extended from the handle, and  
6 the resilient pin is installed inside the chamber of the handle, where one end is  
7 fixed, and the other end is pushed against the shoulder of the blade, for  
8 supplemental driving force blade when the blade is being extracted from the  
9 handle.

10 The present invention provides a pocket knife with a foldable design that  
11 allows the blade to be received within the inner space of the handle.

12 The present invention also provides a supplemental driving aid that can  
13 force the blade of a pocket knife to extend by means of a semi-automatic  
14 operation.

15 The present invention also provides a simplified structural design for a  
16 pocket knife by providing a suitable thickness of the handle to meet the  
17 portability and storage requirements.

18 The present invention is also characterized in that a resilient pin is used  
19 in the design to drive the blade directly when the blade is being pulled out from  
20 the handle to the open position.

21 The features and structure of the present invention will be more clearly  
22 understood when taken in conjunction with the accompanying drawings.

## 23 BRIEF DESCRIPTION OF THE DRAWINGS

24 Fig. 1 is an exploded diagram of the pocket knife with a lock design in

accordance with the present invention;

Fig. 2 is a partial assembly of the pocket knife previously shown in Fig.

1;

Figs. 3 and 4 are different designs of the holding blocks to hold the

resilient pin inside the handle;

Figs. 5-7 are different designs used to fix the resilient pin inside the

handle;

Fig. 8 is a plan view of the pocket knife previously shown in Fig. 1

currently having the blade in the closed position.

Fig. 9 is a plan view of the pocket knife previous shown in Fig. 1

currently having the blade pulled out at a predetermined angle;

Fig. 10 is a plan view of the pocket knife previously shown in Fig. 1

currently having the blade fully extended.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention is illustrated in conjunction with a first preferred

embodiment as shown in Fig. 1. This foldable knife has a handle (10) including a

pivot joint (15), a blade (20) controlled by the pivot joint (15), a safety lock (30)

corresponding to the side wall of the blade (20), and a resilient pin (40). The

handle (10) is formed by a first half (11) and a second half (12), and has an

opening at the front. The first and second halves (11, 12) are joined together in a

conventional manner such as by using screw, rivets and so on. A chamber (13) is

defined by the side walls of the handle (10) for holding the resilient pin (40). The

pivot joint (15) is formed at the front end of handle (10) for receiving the blade

(20) into the handle (10).

1           A holding block (14) is installed on a side wall of the chamber (13)  
2     opposite to the pivot joint (15) for holding one end of the resilient pin (40) firmly  
3     in position.

4           The blade (20) has a cutting side (21), a blunt side, a pointed end and a  
5     pivot end. The pivot end defines a pivot hole (22) extending through the blade  
6     (20). A shoulder (23) formed on the pivot end of the blade (20) has a bevel  
7     shaped guiding edge (24) close to the cutting edge (21) and a driving edge (25) on  
8     the far end of cutting edge (21) perpendicular to the axis of blade (20). A pin  
9     catch (26) is formed between the cutting edge (21) and guiding edge (24).

10          The safety lock (30) is secured in the chamber (13) inside the handle (10)  
11     by the clamping force of the first and second halves (11, 12). In the preferred  
12     embodiment, the safety lock (30) is disposed in between the blade (20) and first  
13     half (11) and has a push plate (31) adjacent to a side opening of the handle (10),  
14     where the free end of the push plate (31) forms a raised head for pushing against  
15     the pivot end of the blade (20) to move the blade (20) into an open position.

16          The resilient pin (40) is installed in the chamber (13) of the handle (10),  
17     wherein one end is held by the holding block (14) in the handle (10), and the  
18     other end touches the shoulder (23) of the blade (20) for supplementing the  
19     extension of the blade (20) to the open position.

20          The holding blocks (14) installed in the chamber (13) of the handle (10),  
21     as shown in Figs. 2 and 3, are placed side by side at the back end or the middle  
22     section of the second half (12), forming a channel (16) for keeping the resilient  
23     pin (40) in position. Alternatively, the holding block (14) can be formed by  
24     multiple blocks inside the chamber (13) of the handle (10), as shown in Fig. 4,

1 and arranged in two rows in alternate positions or in a one-on-one arrangement.  
2 These two rows of holding blocks (14') form a channel (161) for keeping the base  
3 of the resilient pin (40) firmly in place. In a further embodiment, the holding  
4 block (14) can be a single block inside the chamber (13) of the handle (10) (not  
5 shown in the diagrams), where the inward facing end forms a channel (161)  
6 having an inward facing opening, as opposed to the closed other end, used for  
7 keeping the base of the resilient pin (40) firmly in place.

8 The resilient pin (40) is fixed on the base of the handle (10) to form a gap  
9 (41), and the handle (10) has through holes (111, 121) corresponding to the  
10 position of the gap (41) for installing a stopper rod (17), as shown in Fig. 5, or  
11 rivets (171), as shown in Fig. 6, or any other equivalent means for fixing the base  
12 of the resilient pin (40) inside the handle (10). Alternatively, the first half (11)  
13 and second half (12) of the handle (10) are installed with through holes or screw  
14 holes (not shown in the diagram) corresponding to the gap (41) for receiving  
15 screws to fix the base of the resilient pin (40) inside the handle (10).

16 The inner walls of the resilient pin (40) and the handle (10) are designed  
17 to interlock against each other (not shown in diagram) for fixing the base of the  
18 resilient pin (40) inside the handle (10). The resilient pin (40) is fixed on one side  
19 of the base of the handle (10), where flanges (44) are formed, and the inner wall  
20 of the handle (10) has gaps (41) corresponding to the flanges (44), allowing these  
21 two adjacent walls to be interlocked against each other, such that one end of the  
22 resilient pin (40) can be fixed in the handle (10). Conversely, the flanges (44) can  
23 be formed on the inner wall of the handle (10) and the gaps (41) on the side wall  
24 of the resilient pin (40) for generating the same result as mentioned above.

1           As shown in Fig. 7, the resilient pin (40) is fixed at the base of the handle  
2 (10) having a large diameter, and the pivot end of the handle (10) has a  
3 supporting pipe (19) corresponding to a back section of the channel (16), having  
4 a small diameter inner section (191) on one end and a larger diameter outer  
5 section (192) on the other end. The outer section (192) of the supporting pipe (19)  
6 corresponds with the large diameter base of the resilient pin (40) having screw  
7 threads formed on the inner wall. The inner section (191) corresponds with the  
8 outside diameter of the resilient pin (40). The resilient pin (40) is slid into the  
9 channel (16) of the handle (10) through the inner section (191) of the supporting  
10 pipe (19), and then the base (42) of the resilient pin (40) is then fixed onto the  
11 outer section (192) of the supporting pipe (19) using screws (43) for fixing the  
12 resilient pin (40) in the handle (10).

13           In actual operation, as shown in Fig. 8, when folding back the knife to a  
14 closed position, the blade (20) of the pocket knife is received by the handle (10).  
15 The blade (20) is pivotally moved back into the closed position in the handle  
16 (10), and the push plate (31) of the safety lock (30) is placed against the side of  
17 the blade (20). The resilient pin (40) is slightly bent and lodged on one side of the  
18 blade (20), and the free end of the safety lock (30) extends toward the guiding  
19 edge (24) of the blade shoulder (23). At the same time, the push plate (31) of the  
20 safety lock (30) is pushed against the blade (20) to offset the force of the resilient  
21 pin (40) applied on the blade (20).

22           When pulling out the blade (20) from the handle (10), as shown in Figs. 9  
23 and 10, the blade (20) is first pulled out manually to a predetermined angle, and  
24 the protruding point (27) in between the guiding edge (23) and the driving edge

1 (25) is moved to the side of the free end of the resilient pin (40), such that the  
2 force of push plate (31) of the safety lock (30) pushing against the blade (20) is  
3 lessened, and therefore the recoiling force of the resilient pin (40) acts as a  
4 supplemental driving force to extend the blade (20) from the handle (10). When  
5 the blade (20) is pivoted to the front of the handle (10), the push plate (31) of the  
6 safety lock (30) engages the driving edge (25) of the shoulder (23) on the blade  
7 (20), and the free end of the resilient pin (40) extends to the pin catch (26) of the  
8 blade (20) for moving the blade (20) into open position, such that the user can  
9 hold on to the handle (10) and use the cutting edge (21) of the blade (20). When  
10 closing the knife, the user only has to press down the push plate (31) of safety  
11 lock (30) to cause the blade (20) to be released from the shoulder (23), such that  
12 the blade (20) can then be put back pivotally into the handle (10).

13 In summary, the present invention provides a pocket knife with lock  
14 design having a mechanical driving aid for assisting the extension of the blade  
15 (20) into the open position semi-automatically, and a foldable design by means of  
16 a pivot joint. Furthermore, the present invention also provides a simplified knife  
17 structure that helps provide a minimum thickness of handle suitable for  
18 portability and storage.

19 The foregoing description of the preferred embodiments of the present  
20 invention is intended to be illustrative only and, under no circumstances, should  
21 the scope of the present invention be so restricted.